

evident in 1987, but in 1988 pH values remained at 7.0 or above. Salinity values ranged from 0.0 to 0.4 ppt indicating that the lower River and western Albemarle Sound are oligohaline. Patterns of short-term fluctuations in salinity were similar to what might be expected with an internal seiche. Nutrient and heavy metals analyses indicate that concentrations are affected by river flow. Upstream, the average values for solids, turbidity, nitrogen (except for $\text{NO}_2/\text{NO}_3\text{-N}$) and phosphorus species, and metals were higher during moderate and stable flows. In the delta, several parameters including color, TKN, $\text{NH}_3\text{-N}$, SO_4 , Ca, Na, SO_4 , and alkalinity were higher in the lower Roanoke River downstream of Plymouth, NC compared to the Cashie River. Carbon was higher in the Cashie River.

Primary Production. Most of the algae are small species that should be usable as food for grazing zooplankton in the river; concentrations are higher than required for sustaining the zooplankton community found in the study area. The Roanoke phytoplankton is dominated by green algae and diatoms, a community resembling that of a lake more than an estuarine environment. Blue-green algae, usually considered undesirable as food for zooplankton, were not present in significant quantities in the spring. Chlorophyll *a* concentrations showed a clear inverse relationship with Roanoke River flow; i.e., low flow conditions resulted in higher chlorophyll *a* concentrations.

Zooplankton Production. The zooplankton assemblage, resembling that of a freshwater system, was in low abundance within the study area at concentrations much lower than other river systems supporting striped bass populations. Since zooplankton abundance in this system is not phytoplankton limited, then environmental factors must play a role in maintaining low zooplankton abundance. Results indicate that daily river flow, as well as seasonal flow patterns, change the zooplankton communities of the study area. Water temperature, which can be altered by cool reservoir releases upstream, is a major factor in zooplankton abundance because it affects the rate of reproduction. Zooplankton abundance is patchy, with highest concentrations in the delta, especially the Cashie and Middle rivers. In Batchelor Bay, highest concentrations were along the western shore, and western Sound concentrations were highest along the north shore near Edenton Bay. River zooplankton were dominated by copepods (mainly cyclopoids) and cladocerans (mainly *Bosmina* and *Daphnia*). Batchelor Bay was a region of zooplankton community transition; copepods and cladocerans still dominated numerically but the predatory cladoceran *Leptodora* and gammarid amphipods were more abundant. Western Albemarle Sound zooplankton were mostly copepods (75% of all individuals), with cladocerans (primarily *Leptodora*) second in abundance.

Ichthyoplankton Species Composition. Thirty-four species or species groups of young finfishes were found in the study area. The most abundant finfishes (highest to lowest) included Clupeidae (e.g., alewife, blueback herring, American shad, gizzard shad), striped bass, white perch, minnows (genus *Notropis*), Atlantic menhaden, sunfishes (Centrarchidae), and darters (Percidae). Occasional ichthyoplankton species included common carp, brown bullhead, American eel, suckers (*Catostomus*), pirate perch, yellow perch, inland silverside, channel catfish, Atlantic needlefish, white catfish, tessellated darter, eastern mudminnow, bay anchovy,